

Abstract Submitted
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DNA looping by a ligase under nanoconfinement MAEDEH HEIDARPOUR-ROUSHAN, ROBERT RIEHN, North Carolina State University — DNA looping is essential for the function and maintenance of genetic information. We have investigated the kinetic evolution of DNA loops (48500 bp) induced by T4 ligase inside a nanofabricated channel system with a channel cross-section of 100×100 nm², and a few hundred microns channel length. We found that addition of the ligase profoundly alters the behavior of DNA. In particular, ligase acts to stabilize hairpin geometries in which the extended forward and backward arms of the hairpin scan past each other. From the linear density of DNA inside the channel, we deduce that the effective excluded volume vanishes upon addition of T4 ligase and ATP. We conclude that the two strands are effectively stapled together through a large number of weak bonds involving T4 ligase.

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